

**WHAT IS CLAIMED:**

1. An apparatus for use in a marine seismic survey, comprising:  
a seismic survey object; and  
an inertial measurement unit coupled to the seismic survey object.
- 5 2. The apparatus of claim 1, wherein the seismic survey object comprises one of a seismic cable, a seismic receiver, a steering device, and a seismic source.
3. The apparatus of claim 2, wherein the seismic cable comprises one of a streamer and an ocean bottom cable.
4. The apparatus of claim 2, wherein the seismic cable includes one of a sensor module, a steering device,  
10 and an inertial positioning device in which the inertial measurement unit is housed.
5. The apparatus of claim 2, wherein the seismic cable includes a plurality of acoustic receivers.
6. The apparatus of claim 2, wherein the steering device comprises one of a Q-fin and a bird.
7. The apparatus of claim 2, wherein the seismic source comprises at least one of an air gun and a vibrator.
- 15 8. The apparatus of claim 1, further comprising an inertial positioning device in which the inertial measurement unit is housed.
9. The apparatus of claim 1, wherein the inertial positioning device further comprises:  
a power system for the inertial measurement unit;  
a communication interface; and  
20 a battery powering the power system and the communication interface.
10. The apparatus of claim 1, wherein the inertial measurement unit comprises a plurality of accelerometers and gyroscopes.
11. The apparatus of claim 1, wherein the inertial measurement unit comprises a micro-electromechanical inertial measurement unit.
- 25 12. The apparatus of claim 8, wherein the inertial positioning device further comprises an acoustic node determined by either an acoustic source or receiver.
13. The apparatus of claim 12, wherein the acoustically determined point comprises one of an ultra-short baseline acoustic system, a short baseline acoustic system, or a distance measurement acoustic system.

14. A marine seismic spread, comprising:  
a plurality of seismic survey objects, including a plurality of acoustic receivers and at least one  
acoustic source, distributed over a survey area from at least one known point; and  
a plurality of inertial positioning devices coupled to the seismic survey objects and capable of taking  
inertial measurements of the movement of the seismic survey objects relative to the known  
point.
15. The marine seismic spread of claim 14, wherein the plurality of seismic survey objects include a  
plurality of seismic cables comprised of the acoustic sources and the inertial positioning devices.
16. The marine seismic spread of claim 15, wherein the seismic cables comprise one of a plurality of  
streamers and a plurality of ocean bottom cables.
17. The marine seismic spread of claim 14, wherein the seismic survey objects include a one of a plurality  
of a plurality of inertial positioning devices and a plurality of steering devices in which the inertial positioning  
devices are housed.
18. The marine seismic spread of claim 14, wherein the plurality of acoustic receivers comprise a plurality  
of hydrophones or geophones.
19. The marine seismic spread of claim 14, wherein the inertial measurement unit is housed in an inertial  
positioning device.
20. The marine seismic spread of claim 18, in which the inertial positioning device further comprises:  
a power system for the inertial measurement units;  
a communication interface; and  
a battery powering the power system and the communication interface.
21. The marine seismic spread of claim 14, wherein at least one of the inertial measurement units  
comprises a plurality of accelerometers and gyroscopes.
22. The marine seismic spread of claim 14, wherein at least one of the inertial measurement units  
comprises a micro-electromechanical inertial measurement unit.
23. The marine seismic spread of claim 19, wherein the inertial positioning device further comprises an  
acoustic node determined by either an acoustic source or receiver.
24. The marine seismic spread of claim 23, wherein the acoustic source comprises one of an ultra-short  
baseline acoustic system, a short baseline acoustic system, or a distance measurement acoustic system.
25. An apparatus for use in a marine seismic survey, comprising:  
a seismic cable; and  
an inertial measurement unit coupled to the seismic cable.

26. The apparatus of claim 25, wherein the seismic cable comprises one of a streamer and an ocean bottom cable.
27. The apparatus of claim 25, wherein the seismic cable includes one of a sensor module, a steering device, and an inertial positioning device in which the inertial measurement unit is housed.
- 5 28. The apparatus of claim 25, wherein the seismic cable includes a plurality of acoustic receivers.
29. The apparatus of claim 28, wherein the plurality of acoustic receivers comprise a plurality of hydrophones or a plurality of geophones.
30. The apparatus of claim 25, wherein the inertial measurement unit is housed within an inertial positioning device.
- 10 31. The apparatus of claim 30, wherein the inertial positioning device further comprises:  
a power system for the inertial measurement units;  
a communication interface; and  
a battery powering the power system and the communication interface.
- 15 32. The apparatus of claim 25, wherein at least one of the inertial measurement units comprises a plurality of accelerometers and gyroscopes.
33. The apparatus of claim 25, wherein at least one of the inertial measurement units comprises a micro-electromechanical inertial measurement unit.
34. The apparatus of claim 30, wherein the inertial positioning device further comprises an acoustic node determined by either an acoustic source or receiver.
- 20 35. The apparatus of claim 34, wherein the acoustic source comprises one of an ultra-short baseline acoustic system, a short baseline acoustic system, or a distance measurement acoustic system.
36. A method for use in a marine seismic survey, comprising:  
taking inertial measurements of movement of selected points on a seismic spread relative to at least one known point; and  
25 applying the inertial measurements to the known point to determine the positions of the selected points.
37. The method of claim 36, wherein taking the inertial measurements includes taking the inertial measurements during at least one of deploying the spread, retrieving the spread and conducting a survey.
38. The method of claim 36, further comprising supplementing the inertial measurements.
39. The method of claim 38, wherein supplementing the inertial measurements comprises at least one of  
30 calibrating the positions using a coordinate history determined from acoustic ranging signals and integrating one dimensional measures such as acoustic ranges, range differences and pressure differences.

40. The method of claim 36, further comprising deploying the seismic spread at the known point.
41. The method of claim 40, wherein deploying the seismic spread at the known point includes one of deploying the seismic spread to the bottom of a body of water and deploying the seismic spread near to the surface of the body of water.
- 5 42. The method of claim 40, wherein deploying the seismic spread at the known point includes deploying the seismic spread in one of saltwater, fresh water, and brackish water.
43. The method of claim 36, further comprising housing an inertial measurement unit in a seismic survey object.
44. The method of claim 43, wherein housing the inertial measurement unit in a seismic survey object  
10 includes housing the inertial measurement unit in one of a seismic cable, a seismic receiver, a steering device, and a seismic source.
45. The method of claim 36, wherein taking inertial measurements of the movement of selected points on the seismic spread includes taking inertial measurements of the movement of selected seismic survey objects.
46. The method of claim 45, wherein taking inertial measurements of the movement of selected seismic  
15 survey objects includes taking inertial measurements of the movement of at least one of a seismic cable, a seismic receiver, a steering device, and a seismic source.
47. The method of claim 36, wherein the seismic cable includes seismic survey objects having known relative orientations with respect to the selected points on the seismic cable, and the method further comprises determining positions of the selected seismic survey objects based on the determined positions of the selected  
20 points and the known relative orientations.
48. A method for use in a marine seismic survey, comprising:  
deploying a seismic cable at a known point;  
taking inertial measurements of movement of selected points on the seismic cable relative to the known  
point during the deployment; and  
25 applying the inertial measurements to the known point to determine the positions of the selected points.
49. The method of claim 48, wherein the seismic cable includes seismic survey objects having known relative orientations with respect to the selected points on the seismic cable, and the method further comprises determining positions of the selected seismic survey objects based on the determined positions of the selected points and the known relative orientations.
- 30 50. The method of claim 48, wherein deploying the seismic cable comprises one of deploying the seismic cable to the bottom of the water and deploying the seismic cable near to the surface of the water.
51. The method of claim 48, further comprising supplementing the inertial measurements.

52. The method of claim 51, wherein supplementing the inertial measurements comprises at least one of calibrating the positions using a coordinate history determined from acoustic ranging signals and integrating one dimensional measures such as acoustic ranges, range differences and pressure differences.
53. The method of claim 51, wherein deploying the seismic cable at the known point includes one of  
5 deploying the seismic cable to the bottom of a body of water and deploying the seismic cable near to the surface of the body of water.
54. The method of claim 51, wherein deploying the seismic cable at the known point includes deploying the seismic cable in one of saltwater, fresh water, and brackish water.
55. The method of claim 48, further comprising housing an inertial measurement unit in a seismic survey  
10 object comprising a portion of the seismic cable.
56. The method of claim 55, wherein housing the inertial measurement unit in a seismic survey object includes housing the inertial measurement unit in one of a seismic receiver, a steering device, and a seismic source.
57. The method of claim 48, wherein taking inertial measurements of the movement of selected points on  
15 the seismic cable includes taking inertial measurements of the movement of selected seismic survey objects comprising a portion of the seismic cable.
58. The method of claim 57, wherein taking inertial measurements of the movement of selected seismic survey objects includes taking inertial measurements of the movement of at least one of a seismic receiver, a steering device, and a seismic source.
- 20 59. A method for use in a marine seismic survey, comprising:  
conducting a survey with a seismic spread deployed from at least one known point;  
taking inertial measurements of movement of selected points on the seismic spread relative to the  
known point during the conduct of the seismic survey; and  
applying the inertial measurements to the known point to determine the positions of the selected points.
- 25 60. The method of claim 59, further comprising supplementing the inertial measurements.
61. The method of claim 60, wherein supplementing the inertial measurements comprises at least one of calibrating the positions using a coordinate history determined from acoustic ranging signals and integrating one dimensional measures such as acoustic ranges, range differences and pressure differences.
62. The method of claim 59, further comprising deploying the seismic spread at the known point.
- 30 63. The method of claim 62, wherein deploying the seismic spread at the known point includes one of deploying the seismic spread to the bottom of a body of water and deploying the seismic spread to the surface of the body of water.

64. The method of claim 62, wherein deploying the seismic spread at the know point includes deploying the seismic spread in one of saltwater, fresh water, and brackish water.

65. The method of claim 59, further comprising housing an inertial measurement unit in a seismic survey object.

5 66. The method of claim 65, wherein housing the inertial measurement unit in a seismic survey object includes housing the inertial measurement unit in one of a seismic cable, a seismic receiver, a steering device, and a seismic source.

67. The method of claim 59, wherein taking inertial measurements of the movement of selected points on the seismic spread includes taking inertial measurements of the movement of selected seismic survey objects.

10 68. The method of claim 67, wherein taking inertial measurements of the movement of selected seismic survey objects includes taking inertial measurements of the movement of at least one of a seismic cable, a seismic receiver, a steering device, and a seismic source.

69. The method of claim 59, wherein the seismic cable includes seismic survey objects having known relative orientations with respect to the selected points on the seismic cable, and the method further comprises  
15 determining positions of the selected seismic survey objects based on the determined positions of the selected points and the known relative orientations.